WHAT WE CLAIM ARE:

1. A semiconductor optical device comprising:

a substrate having a surface of a first semiconductor having a first lattice constant; and

a semiconductor lamination layer formed on said substrate, said semiconductor lamination layer having an active layer which contains quantum dots of a first kind made of a second semiconductor having a second lattice constant smaller than the first lattice constant.

2. A semiconductor optical device according to claim 1, wherein the active layer further includes barrier layers substantially lattice matching the first lattice constant, and the quantum dots of the first kind are buried in the barrier layers.

3. A semiconductor optical device according to claim 1, wherein the active layer of said semiconductor lamination layer contains quantum dots of a second kind made of a third semiconductor having a third lattice constant larger than the first lattice constant.

4. A semiconductor optical device according to claim 2, wherein the active layer of said semiconductor lamination layer contains quantum dots of a second kind made of a third semiconductor having a third lattice constant in bulk state larger than the first lattice constant.

5. A semiconductor optical device according to claim 3, wherein the quantum dots of the first and second kinds are alternately distributed along a thickness

direction in plane shape among the barrier layers.

6. A semiconductor optical device according to claim 4, wherein the quantum dots of the first and second kinds are alternately distributed along a thickness direction in plane shape among the barrier layers.

7. A semiconductor optical device according to claim 1, wherein the first semiconductor is InP and the second semiconductor is $In_xGa_{1-x}N_yAs_{1-y}$ ($0 \leq x \leq 0.5$, $0 \leq y \leq 0.5$).

8. A semiconductor optical device according to claim 1, wherein the first semiconductor is GaAs and the second semiconductor is GaAsP.

9. A semiconductor optical device according to claim 1, wherein the active layer has a pair of end planes constituting a cavity, and the device further comprising antireflection films formed on the pair of end planes.

10. A semiconductor optical device according to claim 4, wherein the active layer has a pair of end planes constituting a cavity, and the device further comprising antireflection films formed on the pair of end planes.

11. A semiconductor optical device according to claim 10, further comprising a pair of optical fibers optically coupled to the pair of end planes.

12. A semiconductor optical device having quantum dots with tensile strain.

13. An optical communication system comprising:

an input optical fiber for supplying an optical signal; and

a semiconductor optical amplifier comprising a substrate having a surface of a first semiconductor having a first lattice constant, and a semiconductor lamination layer formed on said substrate, said semiconductor lamination layer having an active layer which contains quantum dots of a first kind made of a second semiconductor having a second lattice constant in bulk state smaller than the first lattice constant and quantum dots of a second kind made of a third semiconductor having a third lattice constant in bulk state larger than the first lattice constant.

14. An optical communication system according to claim 13, wherein the active layer further includes barrier layers substantially lattice matching the first lattice constant, and the quantum dots of the first and second kind are buried among the barrier layers.

15. An optical communication system according to claim 14, wherein the quantum dots of the first and second kinds are alternately distributed along a thickness direction in plane shape among the barrier layers.

16. An optical communication system according to claim 13, wherein the first semiconductor is InP and the second semiconductor is $In_xGa_{1-x}N_yAs_{1-y}$ ($0 \leq x \leq 0.5$, $0 \leq y \leq 0.5$).

17. An optical communication system according to claim 13, wherein the first semiconductor is GaAs and the second semiconductor is GaAsP.

18. An optical communication system according to claim 13, wherein the first semiconductor is InP, the second semiconductor is GaAs and the third semiconductor is InAs.

19. An optical communication system according to claim 13, wherein the active layer has a pair of end planes constituting a cavity, and the amplifier further comprising antireflection films formed on the pair of end planes.

20. An optical communication system according to claim 19, further comprising an output optical fiber optically coupled to a remaining one of the pair of end planes.